affluent veins, lessening of difference between the arterial and venous blood-pressure, and consequent slowing of the lymphatic current.

If, as claimed by some, the circulation of the lymph is due mainly to transudation and endosmosis taking place at the periphery, increased pressure in the venous system would be equally, if not more effective in the causation of disturbances of the intermediate plasmatic circulation. The inquiry is not, however, into the causes of lymph-stasis and ectasis, but relates to the influence of cardiac disease in the production of these affections of the lymphatic system.

In conclusion I append the following quotations:—

> "Obstructive engorgement of the great veins extends also to the thoracic duct. When the subclavian vein is filled to distension, the flow of chyle and lymph must encounter a resistance equal to that opposed to the current of any other vessel which empties into the subclavian. Nay, if lymph be the source of the fibrin in the blood, we see, upon simple physical grounds, why the blood of emphysematous patients is poor in fibrin, why the venous crasis presents hyperinosis and increase of fibrin. Restricted afflux of chyle must, moreover, prejudice nutrition both of the blood and of the entire organism. It is one of several causes which contribute to the general emaciation and to the premature marasmus of emphysematous persons; perhaps, too, it may account for the lack of albumen in the serum of the blood, which produces a tendency to the establishment of dropsical symptoms."[1]
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> "The inadequate emptying of the thoracic duct into the left subclavian vein, over-distended with blood, will, in cases of pulmonary emphysema, lead to impoverishment of the blood in so far as concerns such elements as are derived from the lymph, the colorless blood-corpuscles, fibrin, and albumen."[2]

ARTICLE VI.

ON THE USE OF STRYCHNIA IN NERVOUS DISEASE.

By LANDON CARTER GRAY, M.D., of Brooklyn, New York.

IN 1880 Dr. J. S. Jewell,[3] in the course of a debate upon a case that had been narrated by Dr. S. G. Webber, advocated the use of large doses of strychnia, in some cases as much as one-tenth of a grain, in cases of myelitis, commencing as soon as the febrile symptoms had subsided. At the time it seemed to me that the proof was lacking to show the relationship between the improvement and the drug. In a myelitis of the anterior horns (poliomyelitis anterior) or a progressive muscular atrophy the progress of the disease can be foreseen with considerable accuracy, although in the former malady it is not always easy to do this during the first week or even during the first month in some few very subacute cases; and the prognosis is still more assured in that myelitis of the columns of Burdach which we call locomotor ataxia, or in that other affection of the lateral pyramidal column known as lateral sclerosis. Outside of these forms, however, our differentiation of disease lacks precision. The embryological researches of Flechsig, the physiological experiments of Woroschiloff and others, and the fragmentary pathological observations of many, have mapped out other columns in the spinal cord that are probably distinct in their functions, and, therefore, probably distinct in their diseases. There are, for example, the anterior pyramidal columns, the anterior fundamental columns, the lateral columns *proper*, the direct cerebellar columns, the columns of Goll, each of which, according to the pathological knowledge that we have already obtained of the other strands just named, are probably subject to individual disease. Our neurological nomenclature indicates our pathological ignorance in this respect. Any myelitis that is not of the anterior horn, or of the column of Burdach, or of the lateral pyramidal column, is called, in general terms, simply a myelitis; and yet two succeeding cases may be as anatomically distinct as is disease of the anterior horn from disease of the column of Burdach—or, to use simpler and better known terms, as is an essential infantile paralysis from a locomotor ataxia.

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[1] Niemeyer, Text-Book of Practical Medicine, vol. i. p. 120.

[2] Hertz, Ziemssen's Cyclop., vol. v. p. 382.

[3] Journ. Nerv. and Ment. Dis., July, 1879.

These distinctions, it seemed to me at the time of the discussion, and it seems to me still, Dr. Jewell overlooked. But further conversation with Dr. Jewell in after years, and his persistent and earnest belief in the correctness of his views, arrested my attention, so that for several years I have endeavored to verify his observations. I have prescribed strychnia accordingly in many cases of myelitis. In the really acute cases, however, when the onset of the symptoms has been sudden and grave, I have only made some two trials. In these the drug was so badly borne, quickly producing distinct dyspnœa or some exaltation of muscular reflex action which I feared to prolong, that I did not feel warranted in continuing what must be still regarded as an untried method of treatment.

Except in these grave acute cases, febrile symptoms are so much the exception that the rule as to waiting for the subsidence of them will not hold. When the symptoms are subacute, reaching their acme in five to ten days, fever is lacking, unless the patient be a child. In two cases, for example, of myelitis of the anterior horns, I had begun the administration of the drug in doses of $\frac{1}{60}$ to $\frac{1}{40}$ grain, three times daily, but in one the supervention of a distressing dyspnœa, in the other a quickly ensuing cephalalgia and feeling of fulness about the head, made me abandon it. These cases, given in more detail, were as follows:—

CASE I.—C. G., aged 45, robust, vigorous business man, who had been at the head of a large and harassing business for several years. A hard worker, and had for several months past felt himself overworked. Subacute onset of disease. Weary feeling one day in the legs, next day tingling, numb feeling in the fingers and increase of weariness in the legs; on third day legs failed him so that he walked with effort. On third day I saw him. He had distinct motor weakness of lower and upper extremities, slight impairment in the perception of tactile and painful impressions, and slight impairment of response in extremities to faradic and galvanic stimulus, but the polar reactions were not altered. I may say that the electrical alterations were so slight that I had a doubt as to whether they were not within physiological limits. Tendon reflex *nil*. The bladder and the rectum were not affected. *Diagnosis of Poliomyelitis Anterior.* —I immediately put the patient to bed, kept him there for ten days, put him on his feet gradually, administered the iodide of potash, ergot, galvanism, etc., and he made an excellent recovery in some five weeks. It was about the fifth day that I first administered the strychnia, and again about the third week. Each time it produced the same unpleasant dyspnœa.

CASE II.—J. L., 38, a comparatively young man, of excellent health, excellent habits, except that he smoked to excess, who was retiring from business with a competence after twenty years of hard work; he had not, however, felt himself overworked. The onset of the symptoms extended over some six days, at the end of which time he walked with effort, and complained of slight subjective disæsthesiæ in upper and lower extremities. Slight diminution in response of nerves to faradism and galvanism. No polar changes. Sensations of touch and pain very slightly impaired, distinct motor weakness of lower extremities, no electrical alterations. Bladder and rectum unaffected. No tendon reflex. Diagnosis of poliomyelitis anterior. Patient made a good recovery in the course of a month. Strychnia administered about fourteenth day.

CASE III.—In the case of a girl, aged 18, in whom there suddenly supervened a myelitis, affecting the cord from the lumbar enlargement to the cervical enlargement, with early implication of the lateral pyramidal columns. The administration of strychnia, gr. $\frac{1}{60}$, was begun about six months after the onset of the disease. This was on December 20; on the 30th the dose was increased to $\frac{1}{40}$; on January 2, to $\frac{1}{30}$; on the 7th, to $\frac{1}{25}$. On the 11th, after taking the morning dose, there suddenly ensued a violent attack of muscular spasm, affecting the trunk and extremities, so that patient became seriously cyanosed. The attack lasted about an hour, and passed off under the administration of ether by inhalation; but for several days afterward any distinct sound or noise caused spasm.

In some more chronic forms of myelitis, however, I met with more success.

CASE IV.—G. B., 40, butcher. Patient was on board the steamboat "Seawanhaka," that took fire in the Long Island Sound several years ago, and burnt to the water's edge, with a frightful loss of life. Jumping into the water at the cry of "fire," he was struck by the paddle-wheel and rendered unconscious, but was saved. On regaining his consciousness, he found that his lower extremities were paralyzed. Some five years after this he came to St. Mary's Hospital, August 15, 1885. Unable to stand; great motor weakness of lower extremities and paresis of upper; muscles atrophied; marked impairment of faradic response, also of galvanic, and the negative opening contraction obtained with a much weaker current than should be the case; partial paralysis of rectum; tactile and painful sensations much delayed and impaired; no tendon reflexes; never had any cincture feelings; slight cephalalgia and amblyopia. General health greatly impaired; has lost some twenty pounds in weight; is anæmic; suffers much from insomnia. Ergot ext. fld. ʒj ter in die ordered; also, galvanism.

Aug. 26. No improvement.

Sept. 1. Vesical paralysis has slightly increased. Belladonna ordered; ergot discontinued.

10*th*. Increase of rectal weakness, so that he cannot retain feces.

21*st*. No better.

Oct. 17.—No improvement. Strychniæ sulph. gr. $\frac{1}{50}$ ordered three times daily, which was gradually increased to gr. $\frac{1}{40}$ by the 25th.

Nov. 6.—Doing well; can walk about the ward with the aid of a cane in each hand. On the 18th dose increased to gr. $\frac{1}{30}$. 25th, has so improved that he uses only one cane.

Dec. 12.—Walks without any cane, but with great caution.

This improvement continued until he could walk so that only a slight lingering in his gait was noticeable; bladder and rectal trouble almost disappearing. Thinks himself well. On Feb. 9th of this year he was discharged thus benefited, at his own request, since which time I have not heard from him.

CASE V.—K. D., aged 30. Onset shortly after a miscarriage, extending over several weeks, eventuating in complete motor and sensory paralysis of upper and lower extremities, trunk and neck muscles, urinary incontinence, and paresis of sphincter ani. Reaction of degeneration. Tendon-reflex *nil*. She was admitted to St. Mary's Hospital Sept. 4, 1885, having been totally paralyzed some three weeks before admission. Until Oct. 5, *i. e.*, 31 days, she was treated by ergot, ʒiss doses of the fluid extract (Squibb) ter in die, but the symptoms remained stationary. At this date the use of strychnia was begun, in gr. $\frac{1}{40}$ doses, increased by the 28th to gr. $\frac{1}{35}$. Improvement at the latter date was marked, patient being able to move leg slightly, whilst hitherto she had scarcely moved the toes.

Nov. 15.—Dose increased to gr. $\frac{1}{30}$; Dec. 15, to gr. $\frac{1}{20}$, during which lapse of time patient steadily improved until Jan. 10. She was able to get out of bed and sit in a chair. Shortly afterward there were slight symptoms of strychnia poisoning, and the dosage was temporarily reduced to gr. $\frac{1}{30}$. Beyond this point she did not make any essential improvement. Slight feeble movements of the hands and feet, moderate finger and toe movements, sufficient return of strength in the neck and trunk muscles to hold the head and body erect in a chair, not able to walk, this was the uttermost that was reached. After a month's further trial of the strychnia, therefore, it was discontinued, since which time the patient has remained in an almost stationary condition.

In five cases of progressive muscular atrophy I have given strychnia in doses up to gr. $\frac{1}{25}$. In all of them it acted as a remarkable stimulant, inducing such a sense of well-being that most of them have greatly felt the need of it when it was discontinued, so that several take it continuously. In one very marked and typical case $\frac{1}{30}$ to $\frac{1}{25}$ of a grain has been taken daily three times for nearly two years. In none, however, was there any real improvement. Dr. S. Weir Mitchell, in his work on the treatment of neurasthenia by rest and forced feeding, recommends strychnia in doses of gr. $\frac{1}{30}$ at the time when patients are to be taken out of bed. I have pursued this plan in a number of such cases, and have satisfied myself that it is invaluable. But, singular to say, three cases of neurasthenia, which were treated in the general way, bore strychnia in gr. $\frac{1}{30}$ doses badly, severe toxic symptoms being induced in two.

I have, however, never felt myself warranted in giving such doses as Dr. Jewell has given. I have never felt it safe to exceed gr. $\frac{1}{20}$. Indeed, even when giving $\frac{1}{60}$ or $\frac{1}{40}$ of grain, I have always been on my guard, because I have on several occasions found the action of the medicine to be cumulative. It was notably so in the case of transverse myelitis with contracture. Nor have I ever been able to dispossess myself of scepticism as to the benefit to be obtained from a toxic dose, which may possibly vary in amount with each individual and each disease; and I have therefore refrained from increasing the dose beyond the first toxic symptoms.

These cases are too few in number, of course, to warrant any conclusions. As far as they go, they demonstrate that strychnia was not well borne by two cases of severe acute myelitis, or by two subacute cases of mild poliomyelitis anterior; that gr. $\frac{1}{25}$, continued for four days in a case of transverse myelitis with early extension to the lateral columns, given three months after onset, suddenly induced alarming toxic symptoms; that one chronic case of general myelitis of traumatic origin was greatly benefited, as was also a case of general myelitis in which the onset had been gradual; that in five cases of progressive muscular atrophy it acted as a remarkable stimulant; that, as Dr. Weir Mitchell has indicated, it was decidedly beneficial in cases of neurasthenia, which, after being treated by some eight to ten weeks of rest and forced feeding, were taken out of bed, although it failed to agree with three cases of neurasthenia treated in the ordinary way. For these reasons I intend this paper merely as a memorandum upon the subject, which I certainly think is worthy of further attention.

In conclusion, I desire to say that I have been at some pains to examine the physiologically experimental knowledge which we have of this drug, and I have been unable to obtain therefrom any indications as to its employment in this particular therapeutic direction.